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Estimation of the L p-norms of stress functions for finitely connected plane domains

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Abstract

Let u(x, G) be the classical stress function of a finitely connected plane domain G. The isoperimetric properties of the L p -norms of u(x, G) are studied. Payne's inequality for simply connected domains is generalized to finitely connected domains. It is proved that the L p -norms of the functions u(x, G) and u -1 (x, G) strictly decrease with respect to the parameter p, and a sharp bound for the rate of decrease of the L p -norms of these functions in terms of the corresponding L p -norms of the stress function for an annulus is obtained. A new integral inequality for the L p -norms of u(x, G), which is an analog of the inequality obtained by F. G. Avkhadiev and the author for the L p -norm of conformal radii, is proved. © Springer Science+Business Media, Inc. 2006.

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Keywords

Boundary-value problem, Finitely connected domain, Isoperimetric inequality, Stress function, Torsional rigidity